



Wasserstein distance: a flexible tool for statistical analysis

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The need for statistical tools which allow to compare the performances of different models, taking into account a large number of dimensions in the phase space at the same time, spans from theoretical to modelling disciplines. Here the concept of Wasserstein distance is applied in two different cases not, as usual, to the actual distributions of points, but to the invariant measures obtained by those distributions, in order to ease greatly the burden of the computations. The first case focuses on assessing the reliability of a stochastic parametrization applied to a low order model composed by a Lorenz 84 system forced by a Lorenz 63 system, while the second case aims to construct a ranking of the IPCC models based on their performances with respect to reanalyses and observations. In both cases this approach demonstrates its potentialities, providing quantitatively the effort needed to merge different invariant measures into each other and, therefore, clearly showing which are the models which reproduces better the desired behaviour.